NOTES AND EXTRACTS.

NITROGEN IN RAIN WATER.

Meteorologists generally consider that they have done their duty by the rainfall when they measure the quantity and the time of occurrence, either daily or hourly. But the students of agriculture and forestry, those who drink rain water, and those who study the physics of the atmosphere are all alike interested in the chemical composition of the rain water. The time must come when chemical analysis of the rain water will be made systematically at a large number of carefully selected rainfall stations. It is hardly desirable that any of these should be located in large cities, since the rain that falls there has so little influence on agriculture or water supply. The most important stations will be those in the open country, whether inland or near the seacoast, and especially those at mountain tops and base stations. The importance of this subject to agriculture may be estimated from a statement by Mr. H. Ingle, in charge of the chemical work of the Department of Agriculture of the government of the Transvaal. According to "Nature", Mr. Ingle finds that Transvaal soils are deficient in nitrogen, but that the receipt of combined nitrogen from the atmosphere, namely, nitrates, ammonia, etc., is much larger than in England. Thus, at Rothamsted the average annual receipt of atmospheric nitrogen in the rain water amounts to 4.75 pounds annually, whereas in February and March, 1904, in Pretoria, the rainfall brought down about two pounds per acre. As the normal rainfall for these two months is seven inches, while the annual rainfall is thirty inches, it may, therefore, be estimated that the annual quantity of nitrogen brought down by the rain at Pretoria is at least eight and possibly ten pounds per acre, or twice as much as received at Rothamsted in England.

By analogy we may anticipate that the varying proportions of nitrogen brought down in different portions of the United States by the rainfall may be an important consideration in explaining the agricultural peculiarities of special regions.—*C. A.*

THE VAPOR PRESSURE OF MERCURY.

The measurement of atmospheric pressure by means of the mercurial barometer is subject to a slight additive correction, by reason of the fact that the vacuum chamber is filled with the vapor of mercury pressing down on the column and making the atmospheric pressure appear smaller than it actually is.

Professor Morley has recently published the results of a series of determinations of the vapor pressure of mercury at temperatures between 0° and 100°.[1] The results previously given are, as he points out, based mainly upon interpolated or extrapolated values and are widely discordant. Professor Morley's method consists in passing a pure and dry inert gas, either carbon dioxide or hydrogen, through a weighed quantity of mercury contained in Winkler absorption tubes, the current of gas being so slow and contact with the metal so thorough that the gas becomes perfectly saturated with the vapor of mercury. The volume of the gas is measured, and gives, when reduced to the temperature of the mercury, the volume of the saturated vapor. The loss of weight of the mercury in the absorption tubes gives the weight of this saturated vapor, and from these data the pressure of the vapor may be computed.

In one series of experiments, each of which continued for about two weeks, the mercury was kept in a room whose nearly constant temperature was measured by a thermograph. In another case the mercury was immersed in a water bath maintained at constant temperature.

[1] On the vapor pressure of mercury at ordinary temperatures. London, Edinburgh, and Dublin Philosophical Magazine, June, 1904, pp. 662–67.

The following table indicates the method of calculation and gives the results.

The last column is computed by the formula—

$p = ab^t$, in which $\log a = 4.6064$ and $\log b = 0.02856$.

Vapor pressure of mercury.

Temperature.	Weight of 1 liter of mercury vapor.	Weight of 1 liter of mercury vapor at 1 mm.	Vapor pressure observed.	Vapor pressure computed.
° C.	*Milligram.*	*Milligrams.*	*Millimeter.*	*Millimeter.*
0	....	....	....	0.0004
10	....	....	....	0.0008
16	....	....	0.0010	0.0012
20	....	....	....	0.0015
30	0.028	10.60	0.0027	0.003
40	0.054	10.26	0.0052	0.006
50	0.112	9.94	0.0113	0.011
60	0.206	9.65	0.0214	0.021
70	0.378	9.37	0.0404	0.040

These results agree well with those computed by Hertz from 0° to 50°. They are about one-tenth as large as the values found at 0° and 10° by van der Plaats, who used a similar but somewhat less simple method. Professor Morley states that his own values "have now been found the same in experiments made in three different years and with many modifications of apparatus."—*F. O. S.*

WEATHER BUREAU MEN AS INSTRUCTORS.

Prof. H. J. Cox, Chicago, Ill., reports that classes from the schools named below visited the local office of the Weather Bureau during 1904 and were given instruction in the work of the Bureau by some one of the assistants on duty at the station.

February 27 and March 5, Mayfair High School.
March 7 and 8, Austin High School.
March 18, 21, 22, and 23, West Division High School.
April 7, Austin High School.
April 15, West Division High School.
April 28, Young Men's Christian Association Institute.
July 28, John Spry Vacation School.
October 21, Austin High School.
December 8 and 10, University of Chicago.
December 10, Morgan Park High School.

Mr. Charles Stewart, Observer, Spokane, Wash., lectured at the local office on December 9 to the 45 pupils constituting the physical geography class of the Spokane High School on meteorology and the work of the Bureau. Forecasting was touched upon, and the fallacy of long-range forecasts and the moon's influence on the weather were discussed.

Mr. George A. Loveland, Section Director, Lincoln, Nebr., on December 28 spoke briefly before the "Teachers of Science" section of the Nebraska State Teachers Association on the subject of meteorology in the public schools. Mr. Loveland was subsequently elected secretary of the section, of which he has been a member for many years in virtue of his position as instructor in the University of Nebraska.

Mr. Clarence J. Root, Assistant Observer at Charles City, Iowa, reports that on December 10 the office was visited by the superintendent of schools and the seven teachers of the Charles City High School. The instruments were explained and the work of the Bureau and the movement of storm areas discussed.

Mr. H. W. Richardson, Local Forecaster, Duluth, Minn., on December 7 delivered a lecture of about an hour's duration, on the Weather Bureau and its work, to twenty students of the class in physiography of the Superior State Normal School.

Mr. John R. Weeks, Observer, Macon, Ga., delivered two lectures before the students of the science department and members of the faculty of Wesleyan Female College. These lectures were given on November 29 and December 7 and were illustrated with the stereopticon, about one-hundred and seventy-five views and charts being shown. The topics treated were as follows:

FIRST LECTURE.

A brief history history of the science and its progress.
The U. S. Weather Bureau and its work.
A description of the instruments used.
The earth and the sun—the sun the source of all weather.
The atmosphere and its general circulation.
How cyclones and anticyclones are formed.
Their structure and general characteristics.
Some typical cyclones and anticyclones charted and miscellaneous views showing frosts, snow, floods, progress of cold waves, blizzards, etc., caused by them.
Weather forecasting, how its done, its limitations, and its practical application.
To-day's weather (charted) and today's forecast.

SECOND LECTURE.

Hurricanes, a special type of cyclone.
Local storms and their connection with cyclones and anticyclones.
Tornadoes.
Thunderstorms.
The simple physical laws governing the general condition of the atmosphere.
Rain, its formation, distribution, and effect on life.
Temperature, its distribution and effect on life.
Sunshine, its distribution and effect on life.
Climate, a summary of its controls and divisions.

Mr. R. M. Hardinge, Local Forcaster, Syracuse, N. Y., on December 3 lectured at the Weather Bureau office to the physical geography class of the Fayetteville High School on the instruments and forecast work of the Bureau.

Mr. Alfred F. Sims, Local Forecaster, Albany, N. Y., lectured on December 9, at the Weather Bureau office, to a class from the Rensselaer High School.

Mr. S. S. Bassler, Local Forecaster, Cincinnati, Ohio, on December 30 lectured before the Farmers' Institute at Collinsville on "Weather and Weather Forecasting."

KITE WORK BY THE BLUE HILL OBSERVATORY AND THE UNITED STATES WEATHER BUREAU.

In the following communication Mr. A. Lawrence Rotch, Director of the Blue Hill Observatory, calls attention to an apparent inaccuracy in the October REVIEW:

To the EDITOR OF THE MONTHLY WEATHER REVIEW.

The article by S. Tetsu Tamura in the October REVIEW contains a misstatement on page 464, namely: "While the Weather Bureau was conducting this work kiteflying was begun at the Blue Hill Observatory under the direction of Mr. A. L. Rotch." It was said previously: "In 1895 the United States Weather Bureau decided to equip with kites a number of stations." The fact is, however, that in 1894 kites were flown at Blue Hill to obtain meteorological records, and these records, with a description of the apparatus, were published in the Annals of the Harvard College Observatory, Volume XLII, Part I.

A. LAWRENCE ROTCH,
Director.

BLUE HILL METEOROLOGICAL OBSERVATORY,
Hyde Park, Mass., January 12, 1905.

If the expression "this work" in the sentence quoted refers to the use of self-recording instruments, then it is, as Mr. Rotch has pointed out, a mistake. The use of kites by the Blue Hill Observatory to obtain continuous meteorological records antedates their use for that purpose by the United States Weather Bureau. Professor Marvin, in the MONTHLY WEATHER REVIEW for April, 1896, page 114, has referred to the fact that kites were used at Blue Hill in 1894 to secure observations of atmospheric conditions at as high elevations as possible.

In connection with the more important events in the kite work of these two institutions, the following dates are worthy of record. So far as they relate to the Weather Bureau, they are taken for the most part from the notes of Prof. C. F. Marvin, to whom, more than to anyone else, belongs the credit for the form of kite and the instruments, accessories, and methods finally adopted. Work by the Blue Hill Observatory[1] is distinguished by printing the dates in italics.

May 6, 1885. A paper kite about four feet long, covered with cloth and tin foil, was used by Professor McAdie, at Cambridge, for observations of atmospheric electricity. On May 7 a height of 500 feet was attained.[2]

June 17, 1885. Similar kites were used by Professor McAdie for the same purpose at Blue Hill Observatory.[3] These experiments were repeated in June and July, 1891.[4]

August 9, 1892. Professor McAdie used a kite at Blue Hill to determine the value of the potential at points comparatively free from ground and local influences. Mr. Rotch not only placed the observatory at the disposal of the experimenter, but generously defrayed all incidental expenses.[5]

1893. Professor Harrington read a paper before the International Meteorological Congress at Chicago, Ill., on the use of kites in meteorological investigations.

1894. In the summer of this year experiments in kite flying were made by Professor McAdie and Mr. Potter. A large number of kites, mostly of the Malay type, were flown successfully at Mr. Potter's country residence.

In July and August, 1894, Mr. William A. Eddy, who had been very successful in reaching great altitudes with kites designed by himself, spent two weeks at the observatory for the purpose of elevating instruments with his kites.

August 3, 1894. An ordinary Richard thermograph was altered for use in the experiments, the heavy parts being replaced by wood and aluminum.

August 4, 1894. This instrument was raised to a height of 1430 feet.

January 18, 1895. The first Richard thermograph was purchased and records of temperature were obtained during the summer of this year.

August 18, 1895. The first Hargrave kite constructed at the observatory was flown.

August 19, 1895. The first barothermograph was elevated with kites.

September, 1895. A kite of the Hargrave cellular type, made by Mr. Potter, was successfully flown by him. Up to this time kites of the Eddy or Malay type had been used almost exclusively. The evident superiority of the Hargrave type in power and stability of flight led Mr. Potter shortly thereafter to devise the modified form of the cellular kite known as the Potter diamond kite, which can hardly be surpassed in lightness and simplicity of construction.

September 21, 1895. An improved Hargrave kite was used for raising the barothermograph.

October 14, 1895. Professor Hazen and Mr. Potter were officially assigned to the work of devising and perfecting an

[1] Annals of the Astronomical Observatory of Harvard College, vol. 42, part 1, pp. 42 and 67. Monthly Weather Review, September, 1896, vol. 24, p. 323.

[2] Proceedings of the American Academy of Arts and Sciences, N. S. vol. 12, 1884–85, p. 448.

[3] Proceedings of the American Academy of Arts and Sciences, N. S. vol. 13, 1885–86, p. 129.

[4] Annals of the Astronomical Observatory of Harvard College, vol. 40, part 1, p. 53.

[5] Annals of the Astronomical Observatory of Harvard College, vol 40, part 2, p. 122.